AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for performing a virtual endoscopy, comprising:

~~calculating a distance map using three-dimensional (3D) data of a lumen;~~

calculating a multiplanar reconstruction (MPR) of ~~the~~ a lumen;

performing a two-dimensional (2D) region growing in a portion of the lumen on the MPR ~~of the lumen~~;

marking data in the portion of the lumen ~~from~~ during the 2D region growing as a candidate for three-dimensional (3D) rendering; ~~and~~

performing a 3D rendering ~~of~~ on the portion of the lumen within the marked data ~~from the region growing;~~

replacing the marked data with the 3D rendered portion of the lumen; and

displaying an image of the MPR with the 3D rendered portion of the lumen in an area that originally included the marked data.

2. (Currently Amended) The method of claim 1, further comprising:

acquiring ~~the 3D~~ image data from the lumen.

3. (Currently Amended) The method of claim 2, wherein the ~~3D~~ image data is acquired by one of computed tomographic (CT), helical CT, x-ray, positron emission tomographic, fluoroscopic, ultrasound, and magnetic resonance (MR) imaging techniques.

4. (Original) The method of claim 1, wherein the lumen is one of a colon, a pancreas, a bronchi, a larynx, a trachea, a sinus, an ear canal, a blood vessel, a urethra and a bladder.

5. (Original) The method of claim 1, wherein the MPR is calculated orthogonal to the lumen.

6. (Original) The method of claim 1, wherein the MPR is calculated at an endoscope position.

7. (Currently Amended) The method of claim 1, wherein the 2D region growing is performed at the endoscope position.

8. (Currently Amended) The method of claim 1, wherein the 3D rendering ~~of the region associated with the region growing~~ is performed using one of raycasting, surface rendering and volume rendering ~~3D rendering~~ techniques.

9. (Currently Amended) A method for performing a virtual endoscopy, comprising:

calculating a distance map using three-dimensional (3D) data of a lumen;

calculating a multiplanar reconstruction (MPR) of the lumen, wherein the MPR is calculated orthogonal to the lumen at an endoscope position;

performing a first two-dimensional (2D) region growing in a desired portion of the lumen on the MPR ~~of the lumen~~ at the endoscope position;

marking first data in the desired portion of the lumen during the first 2D region growing as a candidate for 3D rendering;

calculating a minimum distance and a maximum distance to the endoscope position in the desired portion of the lumen within the first marked data ~~from data of the first region growing using corresponding distances from~~ by using the distance map to identify a part of the desired portion of the lumen that was not included in the first 2D region growing;

performing a second 2D region growing in the part of the desired portion on the MPR ~~of the lumen for data outside the first region growing; and~~

marking second data in the part of the desired portion during the second 2D region growing as another candidate for 3D rendering;

performing a 3D rendering on the desired portion of the lumen within the first marked data and the part of the desired portion within the second marked data ~~of data associated with the first region growing and the second region growing;~~

replacing the first marked data with the 3D rendered desired portion of the lumen and the second marked data with the 3D rendered part of the desired portion; and

displaying an image of the MPR with the 3D rendered desired portion of the lumen in an area that originally included the first marked data and the 3D rendered part of the desired portion in an area that originally included the second marked data.

10. (Original) The method of claim 9, further comprising:

acquiring the 3D data from the lumen.

11. (Original) The method of claim 10, wherein the 3D data is acquired by one of computed tomographic (CT), helical CT, x-ray, positron emission tomographic, fluoroscopic, ultrasound, and magnetic resonance (MR) imaging techniques.

12-13. (Canceled)

14. (Original) The method of claim 9, wherein the lumen is one of a colon, a pancreas, a bronchi, a larynx, a trachea, a sinus, an ear canal, a blood vessel, a urethra and a bladder.

15. (Currently Amended) The method of claim 9, wherein the 3D rendering ~~of the data associated with the first region growing and the second region growing~~ is performed using one of raycasting, surface rendering and volume rendering ~~3D rendering~~ techniques.

16. (Currently Amended) The method of claim 9, wherein the second 2D region growing is performed within a threshold associated with the calculated minimum and maximum distances.

17. (Currently Amended) A system for performing a virtual endoscopy, comprising:

a memory device for storing a program;

a processor in communication with the memory device, the processor operative with the program to:

calculate a distance map using three-dimensional (3D) data of a lumen;

calculate a multiplanar reconstruction (MPR) of the lumen, wherein the MPR is calculated orthogonal to the lumen at an endoscope position;

perform a first two-dimensional (2D) region growing in a desired portion of the lumen on the MPR ~~of the lumen~~ at the endoscope position;

mark first data in the desired portion of the lumen during the first 2D region growing as a candidate for 3D rendering;

calculate a minimum distance and a maximum distance to the endoscope position in the desired portion of the lumen within the first marked data ~~from data of the first region growing using corresponding distances from~~ by using the distance map to identify a part of the desired portion of the lumen that was not included in the first 2D region growing;

perform a second 2D region growing in the part of the desired portion on the MPR ~~of the lumen for data outside the first region growing; and~~

mark second data in the part of the desired portion during the second 2D region growing as another candidate for 3D rendering;

perform a 3D rendering on the desired portion of the lumen within the first marked data and the part of the desired portion within the second marked data ~~of data associated with the first region growing and the second region growing~~;

replace the first marked data with the 3D rendered desired portion of the lumen and the second marked data with the 3D rendered part of the desired portion; and

display an image of the MPR with the 3D rendered desired portion of the lumen in an area that originally included the first marked data and the 3D rendered part of the desired portion in an area that originally included the second marked data.

18. (Original) The system of claim 17, wherein the processor is further operative with the program code to:

acquire the 3D data of the lumen.

19. (Original) The system of claim 18, wherein the 3D data is acquired by a scanning device using one of computed tomographic (CT), helical CT, x-ray, positron emission tomographic, fluoroscopic, ultrasound, and magnetic resonance (MR) imaging techniques.

20-21. (Canceled)

22. (Currently Amended) The system of claim ~~21~~ 17, wherein the image is displayed by a display device.

23. (Currently Amended) A computer program product comprising a computer useable medium having computer program logic recorded thereon for performing a virtual endoscopy, the computer program logic comprising:

program code for calculating a distance map using three-dimensional (3D) data of a lumen;

program code for calculating a multiplanar reconstruction (MPR) of the lumen, wherein the MPR is calculated orthogonal to the lumen at an endoscope position;

program code for performing a first two-dimensional (2D) region growing in a desired portion of the lumen on the MPR ~~of the lumen~~ at the endoscope position;

program code for marking first data in the desired portion of the lumen during the first 2D region growing as a candidate for 3D rendering;

program code for calculating a minimum distance and a maximum distance to the endoscope position in the desired portion of the lumen within the first marked data ~~from data of the first region growing using corresponding distances from~~ by using the distance map to identify a part of the desired portion of the lumen that was not included in the first 2D region growing;

program code for performing a second 2D region growing in the part of the desired portion on the MPR ~~of the lumen for data outside the first region growing; and~~

program code for marking second data in the part of the desired portion during the second 2D region growing as another candidate for 3D rendering;

program code for performing a 3D rendering on the desired portion of the lumen within the first marked data and the part of the desired portion within the second marked data ~~of data associated with the first region growing and the second region growing;~~

program code for replacing the first marked data with the 3D rendered desired portion of the lumen and the second marked data with the 3D rendered part of the desired portion; and

program code for displaying an image of the MPR with the 3D rendered desired portion of the lumen in an area that originally included the first marked data and the 3D rendered part of the desired portion in an area that originally included the second marked data.

24. (Currently Amended) The ~~system~~ computer program product of claim 23, wherein the computer program logic further comprises ~~comprising~~:

program code for acquiring the 3D data from the lumen.

25. (Currently Amended) The ~~system~~ computer program product of claim 24, wherein the 3D data is acquired by one of computed tomographic (CT), helical CT, x-ray, positron emission tomographic, fluoroscopic, ultrasound, and magnetic resonance (MR) imaging techniques.

26. (Currently Amended) The ~~system~~ computer program product of claim 23, wherein the lumen is one of a colon, a pancreas, a bronchi, a larynx, a trachea, a sinus, an ear canal, a blood vessel, a urethra and a bladder.

27. (Currently Amended) The ~~system~~ computer program product of claim 23, wherein the 3D rendering ~~of the data associated with the first region growing and the second region growing~~ is performed using one of raycasting, surface rendering and volume rendering ~~3D rendering~~ techniques.

28. (Currently Amended) A system for performing a virtual endoscopy, comprising:

means for calculating a distance map using three-dimensional (3D) data of a lumen;

means for calculating a multiplanar reconstruction (MPR) of the lumen, wherein the MPR is calculated orthogonal to the lumen at an endoscope position;

means for performing a first two-dimensional (2D) region growing in a desired portion of the lumen on the MPR ~~of the lumen~~ at the endoscope position;

means for marking first data in the desired portion of the lumen during the first 2D region growing as a candidate for 3D rendering;

means for calculating a minimum distance and a maximum distance to the endoscope position in the desired portion of the lumen within the first marked data ~~from data of the first region growing using corresponding distances from~~ by using the distance map to identify a part of the desired portion of the lumen that was not included in the first 2D region growing;

means for performing a second 2D region growing in the part of the desired portion on the MPR ~~of the lumen for data outside the first region growing; and~~

means for marking second data in the part of the desired portion during the second 2D region growing as another candidate for 3D rendering;

means for performing a 3D rendering on the desired portion of the lumen within the first marked data and the part of the desired portion within the second marked data ~~of data associated with the first region growing and the second region growing;~~

means for replacing the first marked data with the 3D rendered desired portion of the lumen and the second marked data with the 3D rendered part of the desired portion; and

means for displaying an image of the MPR with the 3D rendered desired portion of the lumen in an area that originally included the first marked data and the 3D rendered part of the desired portion in an area that originally included the second marked data.

29. (Currently Amended) A method for performing a virtual endoscopy, comprising:

acquiring three-dimensional (3D) data from a lumen;

calculating a distance map using the 3D data of the lumen;

positioning an endoscope ~~at a desired position~~ in the lumen;

calculating a multiplanar reconstruction (MPR) of the lumen, wherein the MPR is calculated orthogonal to the lumen at the endoscope position;

performing a ~~first~~ two-dimensional (2D) region growing in a desired portion of the lumen on the MPR ~~of the lumen~~ at the endoscope position;

marking data in the desired portion of the lumen during ~~associated with~~ the ~~first~~ 2D region growing as a candidate for 3D rendering;

calculating a minimum distance and a maximum distance to the endoscope position in the desired portion of the lumen within ~~from~~ the marked data ~~of the first region growing using corresponding distances from~~ by using the distance map to identify parts of the desired portion of the lumen that were not included in the 2D region growing;

performing a ~~plurality of~~ 2D region growing[s] ~~for~~ in each of the parts of the desired portion on the MPR ~~data outside the marked data region that is within a threshold associated with the calculation of the minimum and maximum distances of data~~;

marking data in each of the parts of the desired portion ~~associated with the plurality of region growings~~ as a candidate for 3D rendering; ~~and~~

performing a 3D rendering on the desired portion of the lumen within its corresponding marked data and each of the parts of the desired portion within each part's corresponding marked data ~~of the marked regions associated with the first growing and the plurality of region growings~~;

replacing the marked data corresponding to the desired portion of the lumen with the 3D rendered desired portion of the lumen and the marked data corresponding to each of the parts of the desired portion with the 3D rendered parts of the desired portion; and

displaying an image of the MPR with the 3D rendered desired portion of the lumen in an area that originally included its corresponding marked data and the 3D rendered parts of the desired portion in areas that originally included each part's corresponding marked data.

30. (Currently Amended) The method of claim 29, wherein the parts of the desired portion of the lumen that were not included in the 2D region growing are identified by ~~the plurality of region growings are performed until all~~ data that is outside the marked data in the desired portion of the lumen ~~region~~ and that is within ~~the~~ a threshold associated with the calculated minimum and maximum distances ~~has been subjected to at least one of the plurality of region growings~~.